1. (3 points) Suppose that \( f(x) = \frac{1}{\sqrt{5-x}} \) and \( g(x) = \sqrt{x-2} \). What is the domain of the composite function \( (f \circ g)(x) \)?

\[
(f \circ g)(x) = f(g(x)) = f(\sqrt{x-2})
\]

\[
= \frac{1}{\sqrt{5-\sqrt{x-2}}}
\]

\[
x-2 \geq 0 \Rightarrow x \geq 2
\]

\[
5-\sqrt{x-2} > 0
\]

\[
5 > \sqrt{x-2}
\]

\[
25 > x-2 \Rightarrow x < 27
\]

Domain \( (f \circ g) \) is \([-2, 27)\).

2. (3 points) Given that \( f(x) \) is an even function and that \( g(x) = (f(x) + 3)^5 \), is \( g(x) \) an odd function, an even function or neither? Give a clear justification for your answer.

\[
g(-x) = (f(-x) + 3)^5
\]

\[
= (f(x) + 3)^5 \text{ since } f \text{ is even}
\]

\[
= g(x)
\]

Therefore, \( g \) is even.
3. (2 points) Evaluate the quantity \( \sec \left( \frac{4\pi}{3} \right) \).

\[
\sec \left( \frac{4\pi}{3} \right) = \frac{1}{\cos \left( \frac{4\pi}{3} \right)}
\]

\[
= \frac{1}{-\frac{1}{2}} = 2
\]

4. (2 points) Given an acute angle \( \theta \) for which \( \sin \theta = \frac{1}{4} \), evaluate the following quantity.

\[
\sin(\pi - \theta) + \sin \theta + \cos(\pi - \theta) + \cos \theta
\]

Note that:

\[
\cos(\pi - \theta) = -\cos \theta \quad \text{and} \quad \sin(\pi - \theta) = \sin \theta
\]

\[
\sin(\pi - \theta) + \sin \theta + \cos(\pi - \theta) + \cos \theta
\]

\[
= \sin \theta + \sin \theta - \cos \theta + \cos \theta
\]

\[
= 2 \sin \theta
\]

\[
= 2 \left( \frac{1}{4} \right) = \frac{1}{2}
\]